SEQUENCE LISTING

<110> Indian Council of Medical Research

University of Delhi

<120> Mutants of Mycobacteria and process thereof

<130> 11378.0066USWO

<140> US 10/560,605
<141> 2005-12-13

<150> PCT/IN2004/000203
<151> 2004-07-09

<150> IP882/DEL/2003
<151> 2003-07-09

<160> 16

<170> PatentIn version 3.1

<210> 1

<211> 32

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 1
ccatcatgac gtcgtctgac aacggagcgt cc 32

<210> 2

<211> 32

<212> DNA

<213> Artificial Sequence

<220>

<223> Mycobacterium tuberculosis

<400> 2
gggcatatgg caacaccccg gccgcccgct cg 32

<210> 3

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

<223> Mycobacterium tuberculosis

<400> 3
gggcatatga cgctcggctg ttgcggcagc tcg 33

<210> 4

<211> 32

<212> DNA

<213> Artificial Sequence

<220>

<223> Mycobacterium tuberculosis

<400> 4
ccatcatgac ggtggctggc cccgcggtgc gg 32

<210> 5

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

<223> Mycobacterium tuberculosis

<400> 5
ccatcatgac tgtggaacct attcctgtcg gcc 33

<210> 6

<211> 36

<212> DNA

<213> Artificial Sequence

<220>

<223> Mycobacterium tuberculosis

<400> 6
gggcatatgg gctggattcg ccggctattc ctgtcg 36

<210> 7

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

<223> Mycobacterium tuberculosis

<400> 7
gggcatatgg gtgctcaccc actgcttcgc ggg 33

<210> 8

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

<223> Mycobacterium tuberculosis

<400> 8
ccatcatgag tcggtgaccc ccgtatagcc cgg 33

<210> 9

<211> 28

<212> DNA

<213> Artificial Sequence

<220>

<223> Mycobacterium tuberculosis

<400> 9
ggcatatggc tgtccgtgaa ctgccggc 28

<210> 10

<211> 35

<212> DNA

<213> Artificial Sequence

<220>

<223> Mycobacterium tuberculosis

<400> 10
ggacgcgttc atccgagcag caccccgcgc atccg 35

<210> 11

<211> 492

<212> DNA

<213> Mycobacterium tuberculosis

<400> 11
gtgtctgatc cgctgcacgt cacattcgtt tgtacgggca acatctgccg gtcgccaatg 60

gccgagaaga tgttcgccca acagcttcgc caccgtggcc tgggtgacgc ggtgcgagtg 120

accagtgcgg gcaccgggaa ctggcatgta ggcagttgcg ccgacgagcg ggcggccggg 180

gtgttgcgag cccacggcta ccctaccgac caccgggccg cacaagtcgg caccgaacac 240

ctggcggcag acctgttggt ggccttggac cgcaaccacg ctcggctgtt gcggcagctc 300

ggcgtcgaag ccgcccgggt acggatgctg cggtcattcg acccacgctc gggaacccat 360

gcgctcgatg tcgaggatcc ctactatggc gatcactccg acttcgagga ggtcttcgcc 420

gtcatcgaat ccgccctgcc cggcctgcac gactgggtcg acgaacgtct cgcgcggaac 480

ggaccgagtt ga 492

<210> 12

<211> 831

<212> DNA

<213> Mycobacterium tuberculosis

<400> 12

tcatccgagc agcaccccgc gcatccggtt gactgtggcc tggctgatac cggcgtcgcg 60

caggtagccg cccagcgatc cgtaggtctc gtcaatggtc tggcgtgcgg cggccaggta 120

ctccgcgcgg acacccagga ccccgtcgga cagccgggcc ttggtgaacg tcaccacctc 180

gggtgccagt tcggtgtcga aacgctgctg gatcatctcg gagatccggg cccgcagttg 240

tggcacggag tcgttgctgc gcaggtagtc ggcgacgatg acgtcgcggt ccaggccgac 300

cgcttcaagc accagcgcga ccacgaagcc ggtgcgatcc ttacccgcga agcagtgggt 360

gagcaccggg cgtccggcgg caagcagtgt gacgacacga tgtagcgcgc gctgtgctcc 420

attgcgcgtt gggaattggc gatactcgtc ggtcatgtag cgggtggccg cgtcatttat 480

cgactggctg gattcgccgg actcgccgtt ggacccgtca ttggttagca gcctcttgaa 540

tgcggtttcg tgcggcgctg agtcgtcggc gtcatcatcg gcgaggtcgg ggaacggcag 600

caggtggacg tcgatgccgt ccggaacccg tcctggaccg cggcgggcaa cctcccggga 660

cgaccgcagg tcggcaacgt cggtgatccc cagccggcgc agcgttgccc ggccggcgtc 720

gtcgaggcgg ctcagctcgc tggaccggaa cagccgcccc ggccgcaatg cggttgcggt 780

gtcggcgacg tcacgaaagt tccacgcgcc cggcagttca cggacagcca t 831

<210> 13

<211> 2531

<212> DNA

<213> Mycobacterium tuberculosis

<400> 13

cgtcgtctga caacggagcg tccaaatcgt cgggcacgcg gtacacgcca tggtcaatgc 60

ctaaccgccg agtctcatga ggatgcagcg gcacaagctt tgctaccggc tcgccgcggc 120

gggcaatctc aacctctgcc cgccgtagac gagccgcagc agctcggaca ggcgtgtctt 180

cgcctcgtga acgccgaccc gcttcgcagg cgcccagact ttcgcgtcga ccacctgctc 240

accaaacttc gcgatcatcg cctgatacca cagcgccaac gggtagcggt ttgtccaacc 300

gcttcgtcaa cgacaatggg atcgtgaccg acacgaccgc gagcgggacc aattgcccgc 360

ctcctccacg cgccgccgca cggcgcgcat cgtcgccggg tgaatcgccg cagctggtga 420

tcttcgatct ggacggcacg ctgaccgact cggcgcgcgg aatcgtatcc agcttccgac 480

acgcgctcaa ccacatcggt gccccagtac ccgaaggcga cctggccact cacatcgtcg 540

```
gcccgcccat gcatgagacg ctgcgcgcca tggggctcgg cgaatccgcc gaggaggcga    600
tcgtagccta ccgggccgac tacagcgccc gcggttgggc gatgaacagc ttgttcgacg    660
ggatcgggcc gctgctggcc gacctgcgca ccgccggtgt ccggctggcc gtcgccacct    720
ccaaggcaga gccgaccgca cggcgaatcc tgcgccactt cggaattgag cagcacttcg    780
aggtcatcgc gggcgcgagc accgatggct cgcgaggcag caaggtcgac gtgctggccc    840
acgcgctcgc gcagctgcgg ccgctacccg agcggttggt gatggtcggc gaccgcagcc    900
acgacgtcga cggggcggcc gcgcacggca tcgacacggt ggtggtcggc tggggctacg    960
ggcgcgccga ctttatcgac aagacctcca ccaccgtcgt gacgcatgcc gccacgattg   1020
acgagctgag ggaggcgcta ggtgtctgat ccgctgcacg tcacattcgt ttgtacgggc   1080
aacatctgcc ggtcgccaat ggccgagaag atgttcgccc aacagcttcg ccaccgtggc   1140
ctgggtgacg cggtgcgagt gaccagtgcg ggcaccggga actggcatgt aggcagttgc   1200
gccgacgagc gggcggccgg ggtgttgcga gcccacggct acgctcggct gttgcggcag   1260
ctcggcgtcg aagccgcccg ggtacggatg ctgcggtcat tcgacccacg ctcgggaacc   1320
catgcgctcg atgtcgagga tccctactat ggcgatcact ccgacttcga ggaggtcttc   1380
gccgtcatcg aatccgccct gcccggcctg cacgactggg tcgacgaacg tctcgcgcgg   1440
aacggaccga gttgatgccc cgcctagcgt tcctgctgcg gcccggctgg ctggcgttgg   1500
ccctggtcgt ggtcgcgttc acctacctgt gctttacggt gctcgcgccg tggcagctgg   1560
gcaagaatgc caaaacgtca cgagagaacc agcagatcag gtattccctc gacaccccgc   1620
cggttccgct gaaaaccctt ctaccacagc aggattcgtc ggcgccggac gcgcagtggc   1680
gccgggtgac ggcaaccgga cagtaccttc cggacgtgca ggtgctggcc cgactgcgcg   1740
tggtggaggg ggaccaggcg tttgaggtgt tggccccatt cgtggtcgac ggcggaccaa   1800
ccgtcctggt cgaccgtgga tacgtgcggc cccaggtggg ctcgcacgta ccaccgatcc   1860
cccgcctgcc ggtgcagacg gtgaccatca ccgcgcggct gcgtgactcc gaaccgagcg   1920
tggcgggcaa agacccattc gtcagagacg gcttccagca ggtgtattcg atcaataccg   1980
gacaggtcgc cgcgctgacc ggagtccagc tggctgggtc ctatctgcag ttgatcgaag   2040
accaacccgg cgggctcggc gtgctcggcg ttccgcatct agatcccggg ccgttcctgt   2100
cctatggcat ccaatggatc tcgttcggca ttctggcacc gatcggcttg ggctatttcg   2160
cctacgccga gatccgggcg cgccgccggg aaaaagcggg gtcgccacca ccggacaagc   2220
caatgacggt cgagcagaaa ctcgctgacc gctacggccg ccggcggtaa accaacatca   2280
cggccaatac cgcagccccc gcctggacca cccgcgacag caccacggcg cggcgcagat   2340
cggccacctt gggcgaccgg ccgtcgccca aggtgggccg gatctgcaac tcatggtggt   2400
accgggtggg cccacccagc cgcacgtcaa gcgccccagc aaacgccgcc tcgacgacac   2460
```

cggcgttggg gctgggatgg cgggcggcgt cgcgccgcca ggcccgtacc gcaccgcggg 2520

gcgacccacc g 2531

<210> 14

<211> 2890

<212> DNA

<213> Mycobacterium tuberculosis

<400> 14

gtcggtgacc cccgtatagc ccggcgacgt cggtaattta gtagcgccct cgacctgcgc 60

gggcgtgagg tccaaatact tggtgtgtac gaatgtgatg cctgcaaccg cgttgaggtc 120

ggaaatgaag ttgagcgggt atcgcgagaa gtcggcgaac ccgtcgtact cgagcgtgta 180

gatggccgtc ggatagatcg tgtccgaggg cgttgcgcca tagaacgtca ggtccagagt 240

cggaagcgtc agatccggga accgcgcgag cataccgcca ttggggttca tttcattgcc 300

gacaagcacg aaattgaggt cgctcgccga aggtgcggcc ccgcccatcg ccgtgaacct 360

ctgcatctcc agcgacgcga ttatggcgct ttgcgaccag ccgaaaacgg tgaccgcgtt 420

tccggtggtc gcgagctcta ccatgatcgc gtcgtgcaag atggtcaagc cctcttccac 480

tgacgtgttg aggaccaaac ttctgacacc ggtgagtggg tacaactctt cgggtgtgaa 540

gacggcttgt agcgcccgcc gaacggacct acagcgtatt ggcggcgtca acatagacgg 600

cggtggtagt ggaattccgg tgggcccaaa gaacaaggtg gtcaagttcg ccgggaatgg 660

cggaatcatc gcggccgccg cgggggttgg tgcggcggcg ggcacagcca gctgattttg 720

ccgggtgctg gcgatggcgg cctcggcatc tgcgtagctg ttcgccgcgg cggccaacgt 780

ctggtggaac ctaactgtga aacgcctcga cttgagcgag cacggcctgg tattcctggc 840

cgtatgcgcc gaacggtttc gcgatggcgg ccgacacctc atcgccggcc gccgcggcca 900

gtgcacacgt cgggcctgcc gcggccgcgc cggccgtact cacggccgaa ccgattcctg 960

ccacctcggc ggcggccgcc gctacgatcc gcggctcagc gatcagatac gacatcgtct 1020

cactccccta gcaccaggtg tcggccaacc gggtcaaccc ggggttttgg tcagcccaga 1080

gcggtcccgc tgccctggtg gtcgcttacg cgaatcggat tcgcgcgaaa gcgtttcccc 1140

tcatccgagc agcaccccgc gcatccggtt gactgtggcc tggctgatac cggcgtcgcg 1200

caggtagccg cccagcgatc cgtaggtctc gtcaatggtc tggcgtgcgg cggccaggta 1260

ctccgcgcgg acacccagga ccccgtcgga cagccgggcc ttggtgaacg tcaccacctc 1320

gggtgccagt tcggtgtcga aacgctgctg gatcatctcg gagatccggg cccgcagttg 1380

tggcacggag tcgttgctgc gcaggtagtc ggcgacgatg acgtcgcggt ccaggccgac 1440

cgcttcaagc accagcgcga ccacgaagcc ggtgcgatcc ttacccgcga agcagtgggg 1500

gctggattcg ccggactcgc cgttggaccc gtcattggtt agcagcctct tgaatgcggt 1560

ttcgtgcggc gctgagtcgt cggcgtcatc atcggcgagg tcggggaacg gcagcaggtg 1620

gacgtcgatg ccgtccggaa cccgtcctgg accgcggcgg gcaacctccc gggacgaccg 1680

caggtcggca acgtcggtga tccccagccg gcgcagcgtt gcccggccgg cgtcgtcgag 1740

gcggctcagc tcgctggacc ggaacagccg ccccggccgc aatgcggttg cggtgtcggc 1800

gacgtcacga aagttccacg cgcccggcag ttcacggaca gccatctcag gtgaccgccg 1860

cagcgaaggt ggacttctcc ctcgacagct cggcgcgggc gatggagcgc aggtgcacct 1920

cgtcgggacc gtcgaagatg cgcatggcgc ggtgccagcc gtacaaccgg gccagcgggg 1980

tgtcgtcgct gacgccggcg gccccgtgga cctggattgc gcggtcgatg acatcgcagg 2040

ccacccgcgg ggccaccgcc ttgatcatgg cgaccaggtg gcgcgcctct ttgttgccat 2100

gttggtcgat tgtccacgcc gccttttcgc acagcagcct tgcctggtcg atttcgttgc 2160

gggactgagc aatcgcctgt tgcacgacgc cctgttcggc tagcggacgg ccgaacgcca 2220

cccggttgcg gacgcgattc accatgagtg ccaaggcgcg ttcggccgcg cccagcgcac 2280

gcatgcagtg gtggatacgg cccggcccca gccgggcctg ggctatggcg aatccgctgc 2340

cctcttcgcc gagcaggttg gtggccggga cccggacgtt gtggtagtcg atctcgcagt 2400

ggccgtgccg gtcctgccag ccgaacaccg gtgtggagcg aacgatcgtc acgccggggg 2460

tgtcgatcgg gacgaggacc atcgactgct gttggtgggc ggctgcgtcc gggttggtgc 2520

ggcccatcac gatgaggatc ttgcaccgcg ggtccgccgc tcccgacgtc caccacttac 2580

ggccgttgat gacgtagtcg gcaccgtccc gggagatggt ggtttcgatg ttgcgggcgt 2640

cgctgctggc caccgccggc tcggtcatcg agaaggcgct gcggatcttg ccgtcgagca 2700

gcggccgcag ccattgcgcc cgttgctgct cggtgccgaa catgtgcagg atctccatgt 2760

tgccggtgtc cggtgcggcg cagttgagtg cctcgggcgc gatttccatg ctccatccgg 2820

tcatttcggc cagcggcgcg tactccaggt tggtcaatcc cgactcggcc gacaggaata 2880

ggttccacag 2890

<210> 15

<211> 4163

<212> DNA

<213> Artificial sequence

<220>

<223> Mycobacterium tuberculosis

<400> 15

cgtcgtctga caacggagcg tccaaatcgt cgggcacgcg gtacacgcca tggtcaatgc 60

ctaaccgccg agtctcatga ggatgcagcg gcacaagctt tgctaccggc tcgccgcggc 120

gggcaatctc aacctctgcc cgccgtagac gagccgcagc agctcggaca ggcgtgtctt 180

cgcctcgtga acgccgaccc gcttcgcagg cgcccagact ttcgcgtcga ccacctgctc 240

accaaacttc gcgatcatcg cctgatacca cagcgccaac gggtagcggt ttgtccaacc 300

gcttcgtcaa cgacaatggg atcgtgaccg acacgaccgc gagcgggacc aattgcccgc 360

ctcctccacg cgccgccgca cggcgcgcat cgtcgccggg tgaatcgccg cagctggtga 420

tcttcgatct ggacggcacg ctgaccgact cggcgcgcgg aatcgtatcc agcttccgac 480

acgcgctcaa ccacatcggt gccccagtac ccgaaggcga cctggccact cacatcgtcg 540

gcccgcccat gcatgagacg ctgcgcgcca tggggctcgg cgaatccgcc gaggaggcga 600

tcgtagccta ccgggccgac tacagcgccc gcggttgggc gatgaacagc ttgttcgacg 660

ggatcgggcc gctgctggcc gacctgcgca ccgccggtgt ccggctggcc gtcgccacct 720

ccaaggcaga gccgaccgca cggcgaatcc tgcgccactt cggaattgag cagcacttcg 780

aggtcatcgc gggcgcgagc accgatggct cgcgaggcag caaggtcgac gtgctggccc 840

acgcgctcgc gcagctgcgg ccgctacccg agcggttggt gatggtcggc gaccgcagcc 900

acgacgtcga cggggcggcc gcgcacggca tcgacacggt ggtggtcggc tggggctacg 960

ggcgcgccga ctttatcgac aagacctcca ccaccgtcgt gacgcatgcc gccacgattg 1020

acgagctgag ggaggcgcta ggtgtctgat ccgctgcacg tcacattcgt ttgtacgggc 1080

aacatctgcc ggtcgccaat ggccgagaag atgttcgccc aacagcttcg ccaccgtggc 1140

ctgggtgacg cggtgcgagt gaccagtgcg ggcaccggga actggcatgt aggcagttgc 1200

gccgacgagc gggcggccgg ggtgttgcga gcccacggct tctagaggat ccccgggtac 1260

caagccctcg gcgacgttcc gccgggcctc ggcgaccgcc gcgtcgaggc gccggtcgga 1320

ggggcagtcc tccacgggca gctcgtggag ggcgcgggcc agctccgcca tcgcctcgac 1380

cacggcgaac cgctggtgct cgggccactc ctcggccgcc gcgacgccgg ggacggcctc 1440

cgtgacgagc cacgcggcgg tgtcgtcggc accgcgctcg acgacgcggg ggacggggat 1500

cggcggggcc tggcggcgcc tcgccgtcgc agaaccaggc ggtggcgtac accgtcgcct 1560

cggtcggccc gtagagattg gcgatcccga ccgcagcacc accgagaacg tccccgacgt 1620

ggccgaccag cccgtcatcg tcaacgcctg accgcggtgc ggacaggccg tgtcgcgacc 1680

ggccgtgcgg aattaagccg gcccgtaccc tgtgaataga ggtccgctgt gacacaagaa 1740

tccctgttac ttctcgaccg tattgattcg gatgattcct acgcgagcct gcggaacgac 1800

caggaattct gggagccgct ggcccgccga gccctggagg agctcgggct gccggtgccg 1860

ccggtgctgc gggtgcccgg cgagagcacc aaccccgtac tggtcggcga gcccgacccg 1920

gtcatcaagc tgttcggcga gcactggtgc ggtccggaga gcctcgcgtc ggagtcggag 1980

gcgtacgcgg tcctggcgga cgccccggtg ccggtgcccc gcctcctcgg ccgcggcgag 2040

ctgcggcccg gcaccggagc ctggccgtgg ccctacctgg tgatgagccg gatgaccggc 2100

accacctggc ggtccgcgat ggacggcacg accgaccgga acgcgctgct cgccctggcc 2160

cgcgaactcg gccgggtgct cggccggctg cacagggtgc cgctgaccgg gaacaccgtg 2220

ctcacccccc attccgaggt cttcccggaa ctgctgcggg aacgccgcgc ggcgaccgtc 2280

gaggaccacc gcgggtgggg ctacctctcg ccccggctgc tggaccgcct ggaggactgg 2340

ctgccggacg tggacacgct gctggccggc cgcgaacccc ggttcgtcca cggcgacctg 2400

cacgggacca acatcttcgt ggacctggcc gcgaccgagg tcaccgggat cgtcgacttc 2460

accgacgtct atgcgggaga ctcccgctac agcctggtgc aactgcatct caacgccttc 2520

cggggcgacc gcgagatcct ggccgcgctg ctcgacgggg cgcagtggaa gcggaccgag 2580

gacttcgccc gcgaactgct cgccttcacc ttcctgcacg acttcgaggt gttcgaggag 2640

accccgctgg atctctccgg cttcaccgat ccggaggaac tggcgcagtt cctctggggg 2700

ccgccggaca ccgcccccgg cgcctgacgc cccgggccgc ccggcgccgc ccccggcccc 2760

cggcggccgc ccggagcccc gcccgcgctc gggagccccg ggcccgcgcc gaagcccgct 2820

gctgcgagcc cggagcgggc cggccgacgg cggtacccgg ggatcctcta gaacgctcgg 2880

ctgttgcggc agctcggcgt cgaagccgcc cgggtacgga tgctgcggtc attcgaccca 2940

cgctcgggaa cccatgcgct cgatgtcgag gatccctact atggcgatca ctccgacttc 3000

gaggaggtct tcgccgtcat cgaatccgcc ctgcccggcc tgcacgactg ggtcgacgaa 3060

cgtctcgcgc ggaacggacc gagttgatgc cccgcctagc gttcctgctg cggcccggct 3120

ggctggcgtt ggccctggtc gtggtcgcgt tcacctacct gtgctttacg gtgctcgcgc 3180

cgtggcagct gggcaagaat gccaaaacgt cacgagagaa ccagcagatc aggtattccc 3240

tcgacacccc gccggttccg ctgaaaaccc ttctaccaca gcaggattcg tcggcgccgg 3300

acgcgcagtg gcgccgggtg acggcaaccg gacagtacct tccggacgtg caggtgctgg 3360

cccgactgcg cgtggtggag ggggaccagg cgtttgaggt gttggcccca ttcgtggtcg 3420

acggcggacc aaccgtcctg gtcgaccgtg gatacgtgcg gccccaggtg ggctcgcacg 3480

taccaccgat cccccgcctg ccggtgcaga cggtgaccat caccgcgcgg ctgcgtgact 3540

ccgaaccgag cgtggcgggc aaagacccat tcgtcagaga cggcttccag caggtgtatt 3600

cgatcaatac cggacaggtc gccgcgctga ccggagtcca gctggctggg tcctatctgc 3660

agttgatcga agaccaaccc ggcgggctcg gcgtgctcgg cgttccgcat ctagatcccg 3720

ggccgttcct gtcctatggc atccaatgga tctcgttcgg cattctggca ccgatcggct 3780

tgggctattt cgcctacgcc gagatccggg cgcgccgccg ggaaaaagcg gggtcgccac 3840

caccggacaa gccaatgacg gtcgagcaga aactcgctga ccgctacggc cgccggcggt 3900

aaaccaacat cacggccaat accgcagccc ccgcctggac cacccgcgac agcaccacgg 3960

cgcggcgcag atcggccacc ttgggcgacc ggccgtcgcc caaggtgggc cggatctgca 4020

actcatggtg gtaccgggtg ggcccaccca gccgcacgtc aagcgcccca gcaaacgccg 4080

cctcgacgac accggcgttg gggctgggat ggcgggcggc gtcgcgccgc caggcccgta 4140

ccgcaccgcg gggcgaccca ccg 4163

<210> 16

<211> 4522

<212> DNA

<213> Artificial Sequence

<220>

<223> Mycobacterium tuberculosis

<400> 16

gtcggtgacc cccgtatagc ccggcgacgt cggtaattta gtagcgccct cgacctgcgc 60

gggcgtgagg tccaaatact tggtgtgtac gaatgtgatg cctgcaaccg cgttgaggtc 120

ggaaatgaag ttgagcgggt atcgcgagaa gtcggcgaac ccgtcgtact cgagcgtgta 180

gatggccgtc ggatagatcg tgtccgaggg cgttgcgcca tagaacgtca ggtccagagt 240

cggaagcgtc agatccggga accgcgcgag cataccgcca ttggggttca tttcattgcc 300

gacaagcacg aaattgaggt cgctcgccga aggtgcggcc ccgcccatcg ccgtgaacct 360

ctgcatctcc agcgacgcga ttatggcgct ttgcgaccag ccgaaaacgg tgaccgcgtt 420

tccggtggtc gcgagctcta ccatgatcgc gtcgtgcaag atggtcaagc cctcttccac 480

tgacgtgttg aggaccaaac ttctgacacc ggtgagtggg tacaactctt cgggtgtgaa 540

gacggcttgt agcgcccgcc gaacggacct acagcgtatt ggcggcgtca acatagacgg 600

cggtggtagt ggaattccgg tgggcccaaa gaacaaggtg gtcaagttcg ccgggaatgg 660

cggaatcatc gcggccgccg cgggggttgg tgcggcggcg ggcacagcca gctgattttg 720

ccgggtgctg gcgatggcgg cctcggcatc tgcgtagctg ttcgccgcgg cggccaacgt 780

ctggtggaac ctaactgtga aacgcctcga cttgagcgag cacggcctgg tattcctggc 840

```
cgtatgcgcc gaacggtttc gcgatggcgg ccgacacctc atcgccggcc gccgcggcca    900
gtgcacacgt cgggcctgcc gcggccgcgc cggccgtact cacggccgaa ccgattcctg    960
ccacctcggc ggcggccgcc gctacgatcc gcggctcagc gatcagatac gacatcgtct   1020
cactccccta gcaccaggtg tcggccaacc gggtcaaccc ggggttttgg tcagcccaga   1080
gcggtcccgc tgccctggtg gtcgcttacg cgaatcggat tcgcgcgaaa gcgtttcccc   1140
tcatccgagc agcaccccgc gcatccggtt gactgtggcc tggctgatac cggcgtcgcg   1200
caggtagccg cccagcgatc cgtaggtctc gtcaatggtc tggcgtgcgg cggccaggta   1260
ctccgcgcgg acacccagga ccccgtcgga cagccgggcc ttggtgaacg tcaccacctc   1320
gggtgccagt tcggtgtcga aacgctgctg gatcatctcg gagatccggg cccgcagttg   1380
tggcacggag tcgttgctgc gcaggtagtc ggcgacgatg acgtcgcggt ccaggccgac   1440
cgcttcaagc accagcgcga ccacgaagcc ggtgcgatcc ttacccgcga agcagtgggt   1500
ctagaggatc cccgggtacc aagccctcgg cgacgttccg ccgggcctcg gcgaccgccg   1560
cgtcgaggcg ccggtcggag gggcagtcct ccacgggcag ctcgtggagg gcgcgggcca   1620
gctccgccat cgcctcgacc acggcgaacc gctggtgctc gggccactcc tcggccgccg   1680
cgacgccggg gacggcctcc gtgacgagcc acgcggcggt gtcgtcggca ccgcgctcga   1740
cgacgcgggg gacggggatc ggcggggcct ggcggcgcct cgccgtcgca gaaccaggcg   1800
gtggcgtaca ccgtcgcctc ggtcggcccg tagagattgg cgatcccgac cgcagcacca   1860
ccgagaacgt ccccgacgtg gccgaccagc ccgtcatcgt caacgcctga ccgcggtgcg   1920
gacaggccgt gtcgcgaccg gccgtgcgga attaagccgg cccgtaccct gtgaatagag   1980
gtccgctgtg acacaagaat ccctgttact tctcgaccgt attgattcgg atgattccta   2040
cgcgagcctg cggaacgacc aggaattctg ggagccgctg gcccgccgag ccctggagga   2100
gctcgggctg ccggtgccgc cggtgctgcg ggtgcccggc gagagcacca accccgtact   2160
ggtcggcgag cccgacccgg tcatcaagct gttcggcgag cactggtgcg gtccggagag   2220
cctcgcgtcg gagtcggagg cgtacgcggt cctggcggac gccccggtgc cggtgccccg   2280
cctcctcggc cgcggcgagc tgcggcccgg caccggagcc tggccgtggc cctacctggt   2340
gatgagccgg atgaccggca ccacctggcg gtccgcgatg gacggcacga ccgaccggaa   2400
cgcgctgctc gccctggccc gcgaactcgg ccgggtgctc ggccggctgc acagggtgcc   2460
gctgaccggg aacaccgtgc tcacccccca ttccgaggtc ttcccggaac tgctgcggga   2520
acgccgcgcg gcgaccgtcg aggaccaccg cgggtggggc tacctctcgc cccggctgct   2580
ggaccgcctg gaggactggc tgccggacgt ggacacgctg ctggccggcc gcgaaccccg   2640
gttcgtccac ggcgacctgc acgggaccaa catcttcgtg gacctggccg cgaccgaggt   2700
caccgggatc gtcgacttca ccgacgtcta tgcgggagac tcccgctaca gcctggtgca   2760
```

actgcatctc aacgccttcc ggggcgaccg cgagatcctg gccgcgctgc tcgacggggc 2820
gcagtggaag cggaccgagg acttcgcccg cgaactgctc gccttcacct tcctgcacga 2880
cttcgaggtg ttcgaggaga ccccgctgga tctctccggc ttcaccgatc cggaggaact 2940
ggcgcagttc ctctgggggc cgccggacac cgcccccggc gcctgacgcc ccgggccgcc 3000
cggcgccgcc cccggccccc ggcggccgcc cggagccccg cccgcgctcg ggagccccgg 3060
gcccgcgccg aagcccgctg ctgcgagccc ggagcgggcc ggccgacggc ggtacccggg 3120
gatcctctag aggctggatt cgccggactc gccgttggac ccgtcattgg ttagcagcct 3180
cttgaatgcg gtttcgtgcg gcgctgagtc gtcggcgtca tcatcggcga ggtcggggaa 3240
cggcagcagg tggacgtcga tgccgtccgg aacccgtcct ggaccgcggc gggcaacctc 3300
ccgggacgac cgcaggtcgg caacgtcggt gatccccagc cggcgcagcg ttgcccggcc 3360
ggcgtcgtcg aggcggctca gctcgctgga ccggaacagc cgccccggcc gcaatgcggt 3420
tgcggtgtcg gcgacgtcac gaaagttcca cgcgcccggc agttcacgga cagccatctc 3480
aggtgaccgc cgcagcgaag gtggacttct ccctcgacag ctcggcgcgg gcgatggagc 3540
gcaggtgcac ctcgtcggga ccgtcgaaga tgcgcatggc gcggtgccag ccgtacaacc 3600
gggccagcgg ggtgtcgtcg ctgacgccgg cggccccgtg gacctggatt gcgcggtcga 3660
tgacatcgca ggccacccgc ggggccaccg ccttgatcat ggcgaccagg tggcgcgcct 3720
ctttgttgcc atgttggtcg attgtccacg ccgccttttc gcacagcagc cttgcctggt 3780
cgatttcgtt gcgggactga gcaatcgcct gttgcacgac gccctgttcg gctagcggac 3840
ggccgaacgc cacccggttg cggacgcgat tcaccatgag tgccaaggcg cgttcggccg 3900
cgcccagcgc acgcatgcag tggtggatac ggcccggccc cagccgggcc tgggctatgg 3960
cgaatccgct gccctcttcg ccgagcaggt tggtggccgg gacccggacg ttgtggtagt 4020
cgatctcgca gtggccgtgc cggtcctgcc agccgaacac cggtgtggag cgaacgatcg 4080
tcacgccggg ggtgtcgatc gggacgagga ccatcgactg ctgttggtgg gcggctgcgt 4140
ccgggttggt gcggcccatc acgatgagga tcttgcaccg cgggtccgcc gctcccgacg 4200
tccaccactt acggccgttg atgacgtagt cggcaccgtc ccgggagatg gtggtttcga 4260
tgttgcgggc gtcgctgctg gccaccgccg gctcggtcat cgagaaggcg ctgcggatct 4320
tgccgtcgag cagcggccgc agccattgcg cccgttgctg ctcggtgccg aacatgtgca 4380
ggatctccat gttgccggtg tccggtgcgg cgcagttgag tgcctcgggc gcgatttcca 4440
tgctccatcc ggtcatttcg gccagcggcg cgtactccag gttggtcaat cccgactcgg 4500
ccgacaggaa taggttccac ag 4522